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## CLAIMS:

1. A fluid mixing device including a chamber, a bluff body defining one end of the chamber, a first fluid inlet disposed toward an opposite end of the chamber from said bluff body and arranged to direct fluid toward said bluff body, a region substantially surrounding said bluff body including a flow divider defining at least one second fluid inlet to said chamber and at least one mixed fluid outlet from said chamber, a fluid flow from said first fluid inlet and/or from said second fluid inlet establishing a recirculating vortex system within said chamber and resulting in a mixture of fluids from said first fluid inlet and said second fluid inlet(s) being directed through said mixed fluid outlet(s).

2. A fluid mixing device as claimed in claim 1 wherein said bluff body includes egress means for releasing fluid from said chamber.

3. A fluid mixing device as claimed in claim 2 wherein said egress means include material porous to said fluids forming at least part of said bluff body.

4. A fluid mixing device as claimed in claim 2 wherein said egress means include one or more apertures through said bluff body.

5. A fluid mixing device as claimed in claim 4 wherein said bluff body includes a centrally disposed aperture.

6. A fluid mixing device as claimed in claim 5 wherein said first fluid inlet is directed substantially toward said aperture.

7. A fluid mixing device as claimed in claim 6 wherein said aperture has a circular cross section.

~~A fluid mixing device as claimed in any one of 1 to 7 wherein said flow divider~~

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~~Sub 1~~ defines a series of flow channels which form said second fluid inlets and said mixed fluid outlets.

5 9. A fluid mixing device as claimed in claim 8 wherein alternate ones of said flow channels spaced around said bluff body respectively form said second fluid inlets and said mixed fluid outlets.

10 10. A fluid mixing device as claimed in claim 9 wherein said flow divider has a corrugated profile so as to repeatedly cross said region surrounding the bluff body.

15 11. A fluid mixing device as claimed in claim 9 wherein said chamber includes an outer wall extending substantially around the perimeter of said region surrounding the bluff body.

12. A fluid mixing device as claimed in claim 11 wherein said corrugated profile alternately contacts the bluff body and said outer wall.

20 13. A fluid mixing device as claimed in claim 12, wherein all flow channels defined by said corrugated profile are substantially equidistant from the bluff body and from the outer wall.

25 14. A fluid mixing device as claimed in claim 12 wherein flow channels defined by said corrugated profile are alternately substantially closer to the outer wall and substantially closer to the bluff body.

30 15. A fluid mixing device as claimed in claim 14 wherein the flow channels are substantially closer to the outer wall form said second fluid inlets and the flow channels closer to the bluff body form said mixed fluid outlets.

35 ~~Sub 2~~ 16. ~~A fluid mixing device as claimed in any one of 9 to 15 wherein said corrugated~~

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<sup>gubx</sup><sub>cont</sub>  
A profile is of triangular form so that ~~said flow channels are generally triangular in cross section.~~

5 17. A fluid mixing device as claimed in claim 16 wherein at least alternate flow channels have substantially the same cross section size.

18. A fluid mixing device as claimed in claim 17 wherein said corrugated profile defines eight flow channels forming second fluid inlets each alternately interposed with eight flow channels forming mixed fluid outlets.

10 19. A fluid mixing device as claimed in claim 18 wherein the mixing device has eight-fold azimuthal symmetry about a longitudinal axis.

<sup>A3</sup><sub>SaB</sub>  
15 20. ~~A fluid mixing device as claimed in any one of 1 to 19 wherein the flow divider protrudes beyond said bluff body.~~

21. A fluid mixing device as claimed in any one of 1 to 20 wherein the flow divider extends into said chamber.

20 22. A fluid mixing device as claimed in any one of 1 to 21 wherein said first fluid inlet is spaced toward said bluff body from said opposite end of the chamber.

<sup>SaB</sup><sub>25</sub>  
23. A fluid mixing device as claimed in claim 22 wherein the spacing h of the first fluid inlet from said opposite end satisfies the relationship

$$0 \leq h/L \leq 1$$

where L is the distance from the opposite end to the bluff body.

30 24. A fluid mixing device as claimed in claim 23 wherein the ratio h/L is about 0.4.

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A4  
Sub 0

25. ~~A fluid mixing device as claimed in any one of 1 to 24 wherein said chamber is formed by a generally cup-shaped body with said bluff body disposed at or adjacent an open end.~~

5 26. A fluid mixing device as claimed in claim 25 wherein said first fluid inlet is centrally disposed in the base of said cup.

A5  
Sub

10 27. ~~A fluid mixing device as claimed in any one of 25 or 26 wherein said flow divider extends between the wall of said cup adjacent the open end and said bluff body.~~

28. A fluid mixing device as claimed in claim 27 wherein said flow divider is fixed to the wall of said cup.

A6  
Sub

15 29. ~~A fluid mixing device as claimed in any one of 1 to 28 wherein said mixing device is a burner.~~

30. A fluid mixing device as claimed in claim 29 wherein said first fluid inlet supplies combustible fuel and said second fluid inlets supply air to the chamber.

20 31. A fluid mixing device as claimed in claim 30 wherein said combustible fuel is a gaseous fuel.

25 32. A fluid mixing device as claimed in claim 30 wherein said combustible fuel is a gaseous hydrocarbon fuel.

Signature